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**Universal Gravitation & Circular Orbits Practice**

    

1. Determine the force of gravity that the moon experiences from the Earth. (, , ) ***1.99 x 1020 N***
2. Assuming the moon makes a circular orbit around the Earth, what is the tangential orbital speed of the moon? ***1019 m/s***
3. Assuming the moon makes a circular orbit around the Earth, what is the orbital period of the moon? How does this compare to the value you accept? ***2,367,000 s = 27.4 d***
4. The mass of Mars is  that of Earth, and its radius is  that of Earth. How would the gravitational field strength of Mars compare to Earth’s? ***x = 2/5 of Earth’s gravitational field***
5. A newly discovered planet has one half the Earth’s radius, but an unknown mass. Scientists discover that the acceleration due to gravity on the planet is 4.9 m/s2. Estimate the mass of the new planet in terms of the Earth’s mass. ***x = 1/8 of Earth’s mass***
6. An earth satellite moves in a circular orbit at a speed of 5500 m/s. What is its orbital period? ***15,063 s = 4.18 h***
7. Planet Z is 10,000 km in diameter. The free-fall acceleration on Planet Z is 8.0 m/s2. What is the mass of Planet Z? What is the free-fall acceleration 10,000 km above Planet Z? ***3.0 x 1024 kg; 0.88 m/s2***
8. One of Jupiter’s moons, Callisto, has an orbital period of 16.7 days. If the mass of Jupiter is estimated to be 1.90 x 1027 kg, what is the orbital radius of Callisto? ***1.88 x 109 m***
9. The second largest moon in our solar system, Titan, orbits Saturn every 15.95 days. The orbital radius is 1.221 x 106 km. Estimate the mass of Saturn. ***5.67 x 1026 kg***